

REMARKS

In view of the above amendments and following remarks, reconsideration of the objections and rejections contained in the Office Action of February 10, 2005 is respectfully requested.

It is initially noted that a number of minor editorial changes have been made to the specification and abstract for the sake of form.

Further, original claims 1-5 have now been canceled and replaced by new claims 6-12. Claims 6-10 correspond to claims 1, 2, 5, 3 and 4, respectively. Of these claims, claims 6 and 10 are independent claims corresponding to prior independent claims 1 and 4. All of the claims clearly distinguish over U.S. Patent 6,364,316 to Arora.

Both claims 6 and 10 include limitations that correspond substantially to those of original claims 1 and 4. However, both claims have been drafted to describe the shaft seal mechanism as forming a leaf seal, and to state that the thin plates are lapped on one another in layers in a circumferential direction of the rotor. Such serves to clearly distinguish the present invention over Arora.

The present invention is directed to an improvement of prior art leaf seals for a shaft seal mechanism as described with respect to Fig. 6. In such types of seals, as can be seen from Fig. 6, thin plates 9 are overlapped with each other in a circumferential direction of a rotor 2, having their widthwise direction coincident with the axial direction. It is clear, for example, noting the other drawing figures, that the thickness direction in the circumferential direction is relatively thin as compared to the widthwise direction or the length of each of the thin plates 3, as they are of a flat shape, arranged in layers and with a minute gap providing between each of the thin plates 3 in the circumferential direction. This forms a thin plate assembly 9.

Applicants have recognized with the prior art leaf seal as described, it is necessary to individually prepare exclusive jigs according to the diameter sizes because of different kinds of rotor diameter sizes. The necessity of providing such exclusive jigs prevents reduction in manufacturing costs. To address this problem, the present invention has been developed.

Thus, according to one aspect of the present invention, the plurality of thin plates 29, lapped on one another in layers in a circumferential direction of the rotor, are arranged in the annular space

between the rotor and the stator so as to form the thin plate assembly 29a of annular shape. A pair of thin plate retaining rings 51 and 52 are used to pinch or hold the thin plates between them. Accordingly, the curvature can be freely changed according to the curvature of the place where the shaft seal mechanism is to be provided. Thus, no exclusive jig as was conventionally necessary needs to be prepared.

In accordance with another aspect according to the invention, mutually adjacent ones of the outer circumferential proximal end sides of the thin plates of the thin plate assembly are welded to each other so as to be fixed to each other. The thin plate assembly that is so welded is bent along the circumferential plane of the annular space. This allows for the curvature to be freely changed according to the curvature of the location where the shaft seal mechanism is to be provided.

Thus, while the present invention relates to a leaf seal mechanism, the invention of Arora relates to a finger seal mechanism. This type of sealing mechanism has a distinctly different structure from that of the present invention. Specifically, a leaf seal is constructed so that a plurality of thin plates are lapped one in another in layers in the circumferential direction of the rotor. The thin plates thus serve to partition the high pressure area on a fluid flow upstream side from a low pressure area. This allows for fluid flow only little by little from the high pressure side toward the low pressure through the small gaps between each of the thin plates.

In Arora, which is a finger seal, two diaphragm members 24a and 24b are provided in the axial direction of the rotor in order to partition the high pressure side from the low pressure side. While these diaphragms 24a and 24b have finger portions 62 and foot portions 66, they do not form thin plates that are lapped on one another in layers in a circumferential direction of the rotor. It is quite clear, indeed, that the seal is of an entirely different type than that which is claimed.

For the above reason alone, both independent claims 6 and 10 distinguish over Arora. However, the following further distinctions are noted.

There is no disclosed flexibility to cover plates 20 and 28 of Arora, and thus it is not seen how they can correspond to the pair of flexible thin plate retaining rings of claim 6.

Claim 7 requires a deviation preventing member between the outer circumferential proximal end side of the thin plates and the thin plate retaining rings. However, there does not appear to be

any such deviation preventing member on the outer circumferential proximal end side of any thin plates in Arora.

Noting new dependent claim 12, there are also no thin plates, which are lapped on one another in layers in a circumferential direction of the rotor, where their width is greater than the thickness, and where the width extends in the axial direction of the rotor.

Independent claim 10 requires the outer circumferential proximal end sides of the thin plates to be welded to each other so as to be fixed to each other. However, no such welding on the outer circumferential proximal end side of any thin plates is disclosed or suggested by Arora.


New independent claim 11 distinguishes over Arora for a number of the reasons already discussed.

Accordingly, it is respectfully submitted that all of the claims now pending clearly distinguish over Arora. Indication of such is respectfully requested.

In view of the above amendments and remarks, it is submitted that the present application is now in condition for allowance, and the Examiner is requested to pass the case to issue. If the Examiner should have any comments or suggestions to help speed the prosecution of this application, the Examiner is requested to contact Applicants' undersigned representative.

Respectfully submitted,

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